MECH 5337/6337: Aero Dynamics and Control

Class Reference Number: 16486 & 16487
Class Meeting: 10:30 pm - 11:50 AM TR / Chemistry Computer Sci Bldg 1.0202

Instructor: Angel Flores-Abad, PhD
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Office: A109
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Office hours: 3:30 PM – 4:30 PM MWs or by appointment.

COURSE OBJECTIVES

To acquire the fundamentals on spacecraft dynamics and control considering the effects of orbital mechanics. Particular focus is placed on rigid body kinematics and dynamics, attitude control, orbital determination and orbital maneuvers.

COURSE OBJECTIVES

- Students will use mathematical tools and physical laws to obtain the attitude dynamics of space vehicles.
- Students will apply control systems techniques to achive a desired state of the space vehicles.
- Students will use computer tools to validate and analyze both the dynamics and controls of space systems.

TOPICS COVERED

- Dynamics Systems Modelling
- Rotational kinematics
- Dynamics Systems and Controls
- Orbital Dynamics
- Orbital Maneuvers and Controls
- Rigid-body Dynamics
- Rotational Maneuvers and Controls

TEXTBOOKS

- [1] Space Vehicle Dynamics and Control, AIAA Education 2nd Edition, by Bong Wie.
- [2] Space Vehicle Guidance, Control, and Astrodynamics by Bong Wie.
- [3] Analytical Mechanics of Space Systems, by H. Schaub and J. Junkins.
- [4] Orbital Mechanics for Engineering Students, 2nd Edition by Howard Curtis.

GRADING

- Homework, quizzes, online activities, in-class assignments, etc. 50%
- Project 50%

Scale A $\geq$ 900, B $\geq$ 800 but <900, C $\geq$ 700 but <800, D $\geq$ 600 but <700 and F <600

SOFTWARE

Matlab. https://www.mathworks.com/academia/tah-portal/university-of-texas-at-el-paso-40735445.html#get.

Matlba toolboxes: Symbolic, Control Systems, Simscape, Multibody, Aerospace blockset.

AGI STK https://licensing.agi.com/stk/

Refer to ETC for specific question. Engineering building room E226

MATERIAL FOR CLASS

Required: Laptop

DISCLAIMER

The above schedule, policies, and assignments in this course are subject to change in the event of contingency or by mutual agreement between the instructor and the students.